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Yu et al.

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(54) **ELECTRICAL CONNECTOR WITH ENGAGING ARMS FORMED ON COVER**

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(30) **Foreign Application Priority Data**

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H01R 13/6582 (2011.01)
H01R 24/64 (2011.01)

(52) **U.S. Cl.**
CPC ***H01R 13/6582*** (2013.01); ***H01R 24/64*** (2013.01)

(58) **Field of Classification Search**
CPC H01R 24/64; H01R 23/6873; H01R 13/6594; H01R 13/518; H01R 13/6583; H01R 12/724; H01R 13/6582
See application file for complete search history.

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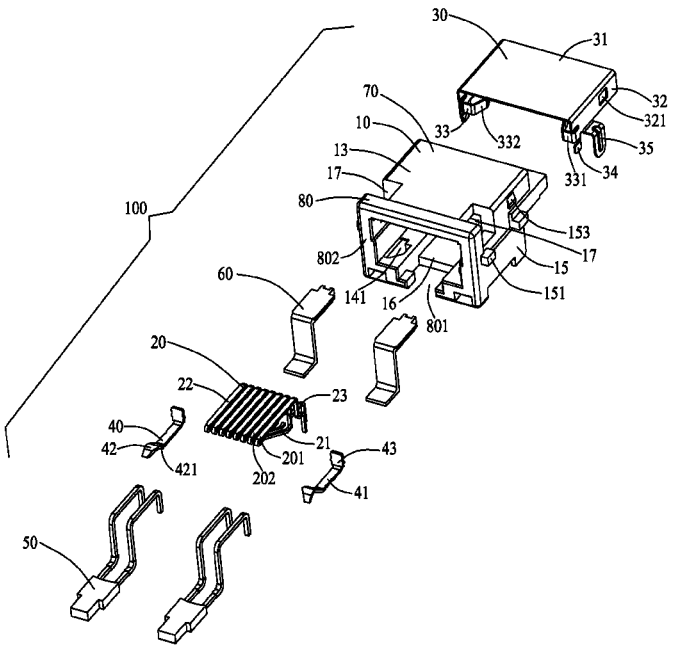
(57) **ABSTRACT**

An electrical connector includes an insulative housing, a number of contacts retained in the insulative housing and a cover shielding the insulative housing. The insulative housing includes a top wall, a pair of side walls and a plug-receiving cavity formed thereby. Each contact includes a resilient contacting portion extending into the plug-receiving cavity. The cover includes a top plate covering the top wall and a pair of side plates respectively covering the pair of side walls. Each side plate includes an engaging arm extending inwardly therefrom. The insulative housing defines a pair of cutouts formed at boundaries of the top wall and the pair of side walls. The pair of engaging arms extend into the plug-receiving cavity through the pair of cutouts, respectively.

18 Claims, 8 Drawing Sheets



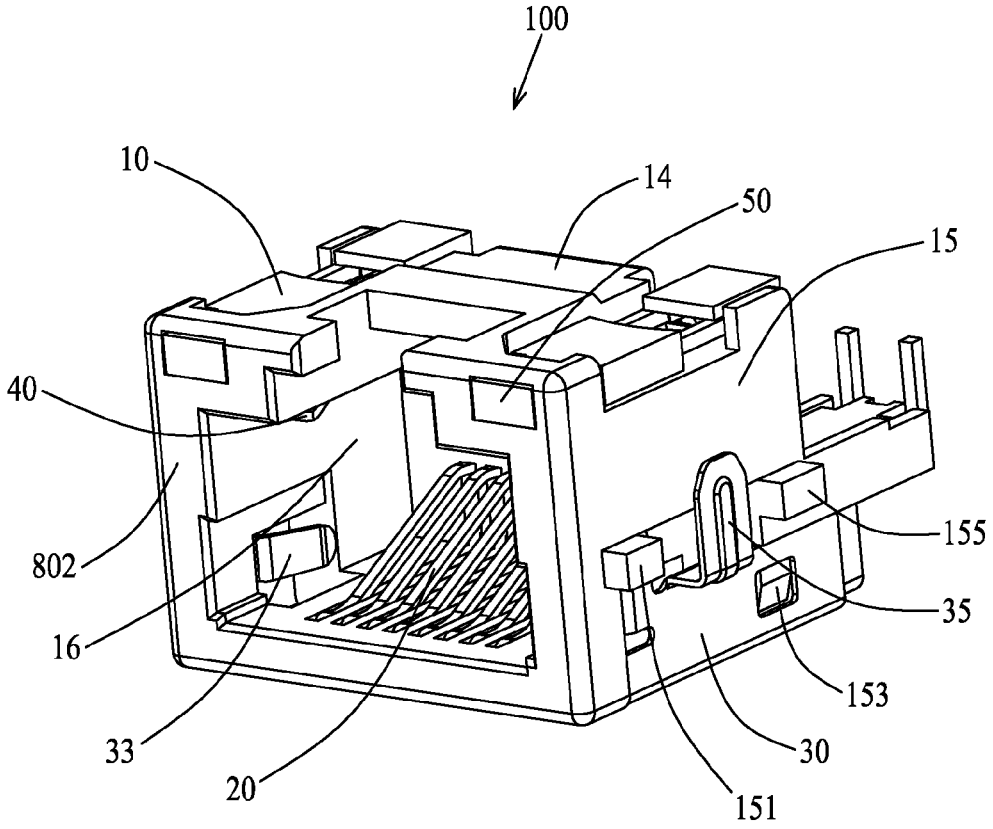


FIG.1

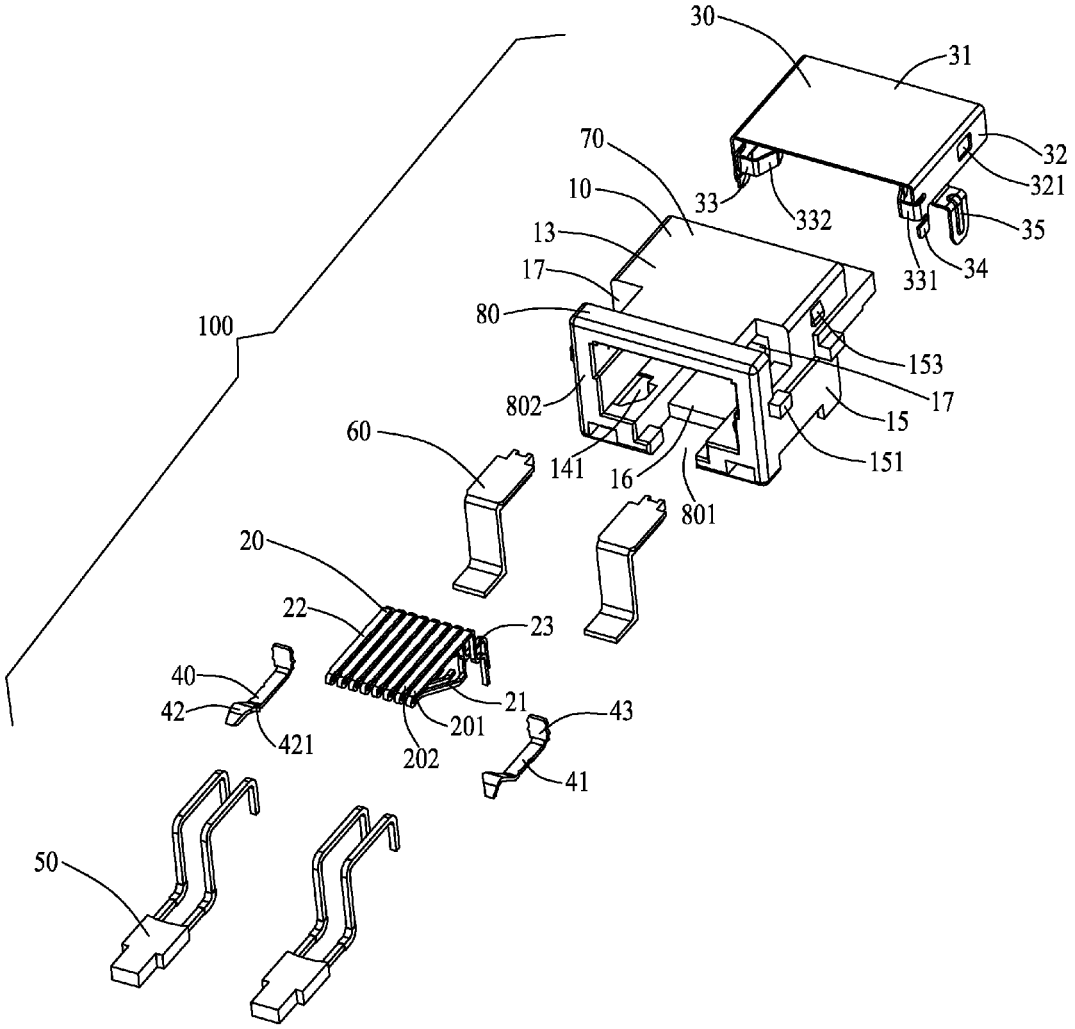

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FIG.2

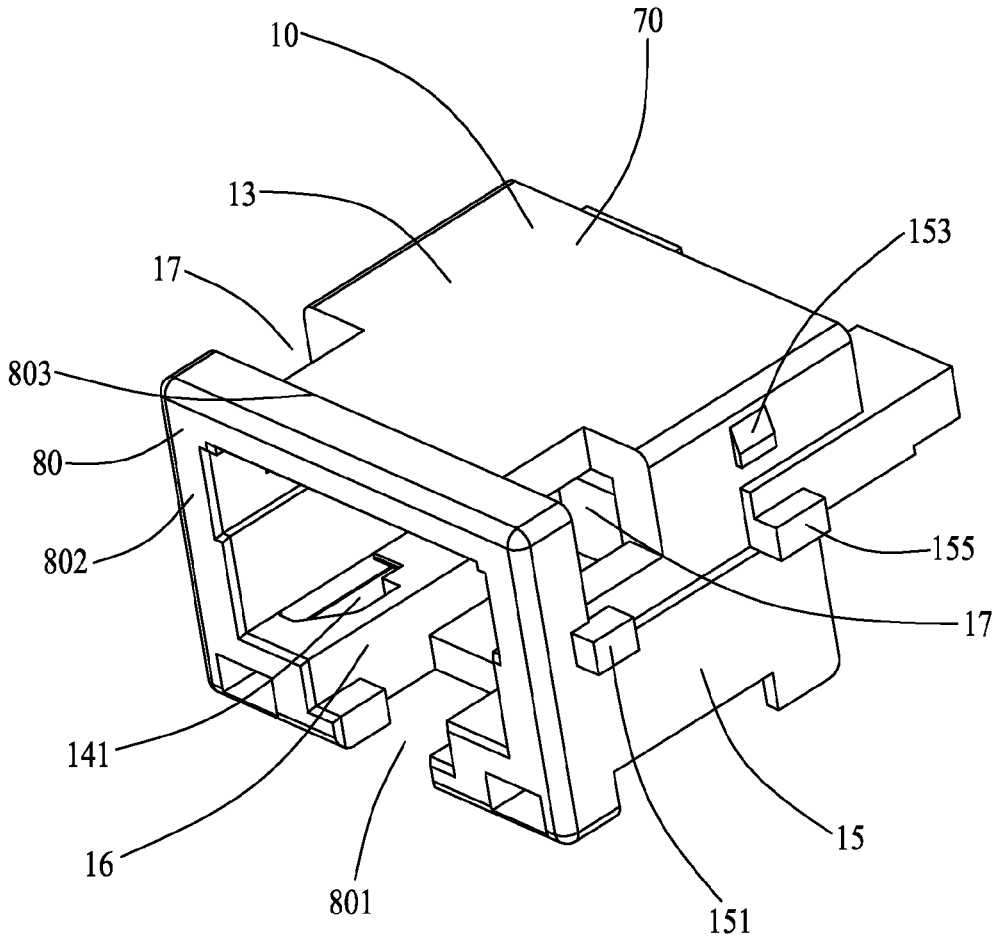

FIG.3

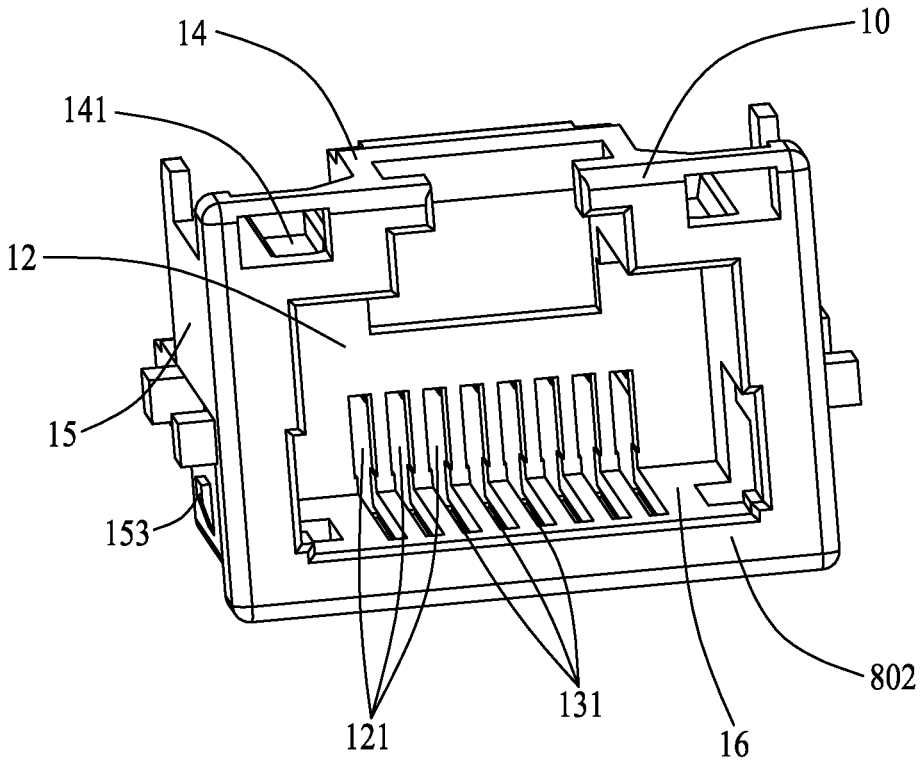

FIG.4

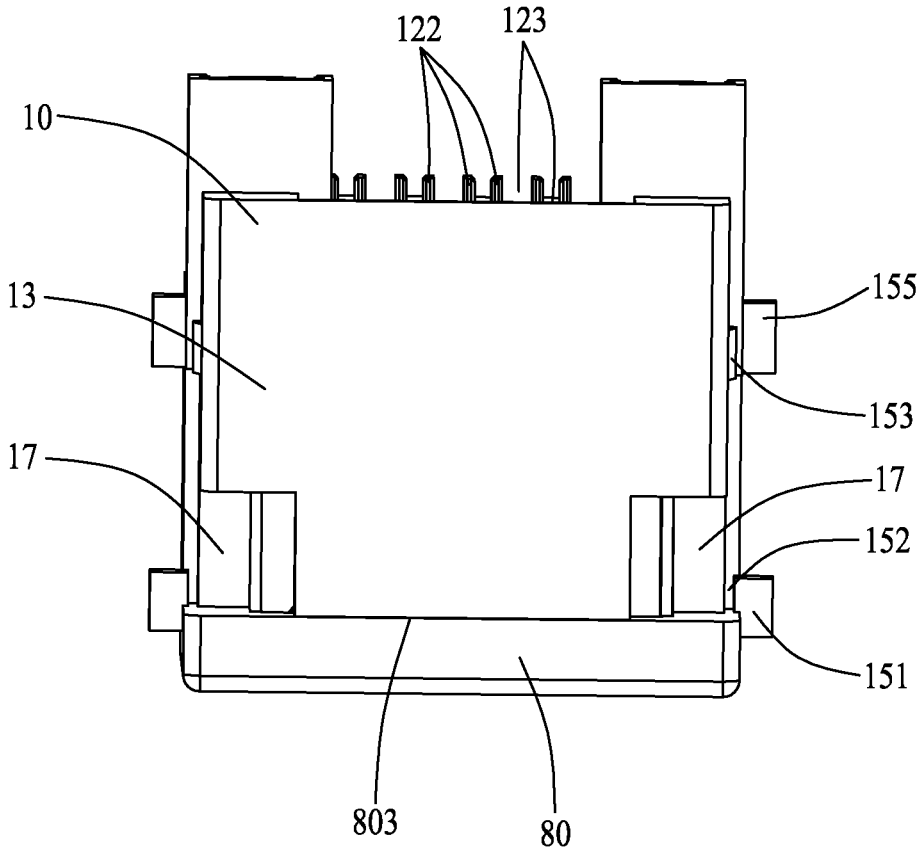

FIG.5

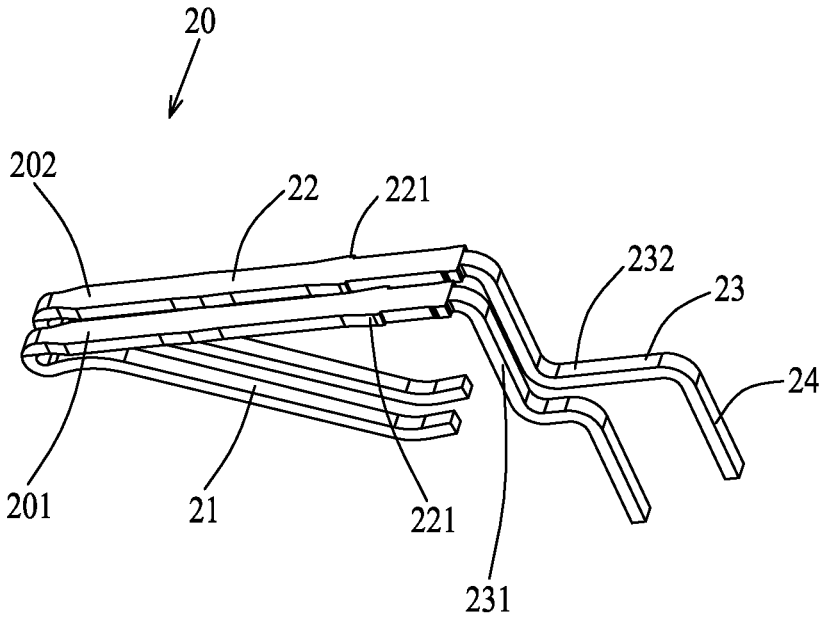

FIG.6

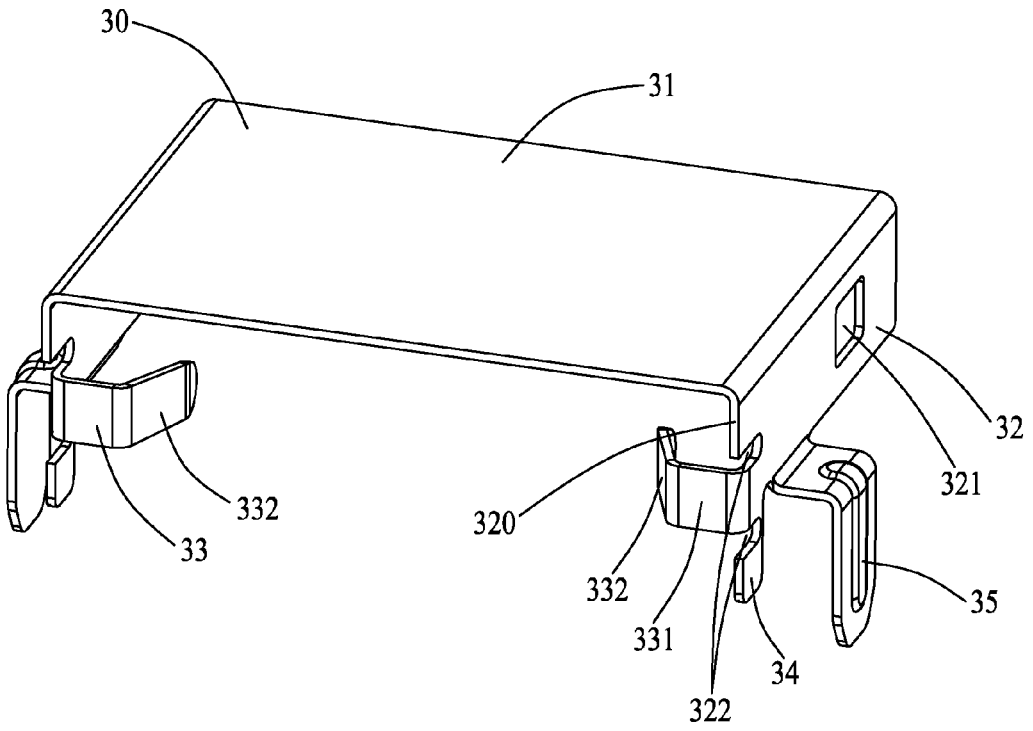

FIG.7

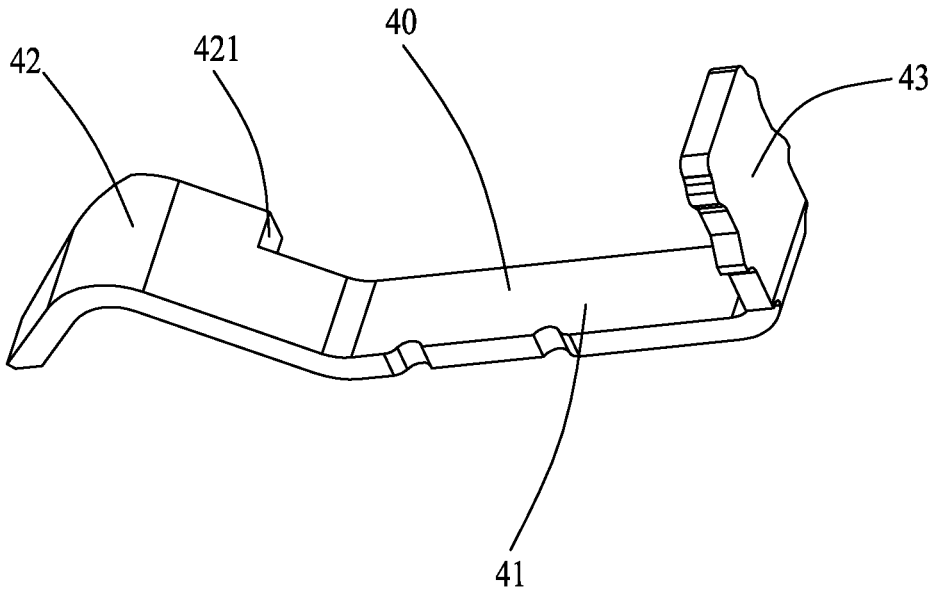

FIG.8

ELECTRICAL CONNECTOR WITH ENGAGING ARMS FORMED ON COVER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an electrical connector, and more particularly, to a RJ 45 connector mounted to a circuit board.

2. Description of Related Art

With rapid development electronic technologies, electrical connectors have been widely used in electronic devices for exchanging information and data with external devices. An electrical connector usually includes an insulative housing, a plurality of contacts received in the insulative housing and a cover shielding the insulative housing for EMI protection. Soldering portions of the contacts usually extend beyond the insulative housing for being mounted to a circuit board.

In order to meet the requirements of stable signal transmission and high effective transmission of the electronic devices, strong mating stabilization of electrical connectors needs to be ensured. As a result, it is very important for accurately assembling the electrical connectors. If the electrical connectors are incorrectly assembled, the electrical connectors will not only mismatch the mating connectors, but also be damaged. However, the covers of conventional RJ 45 connectors are of whole-encompassing configurations, either in a single piece or in two pieces. As a result, the covers are complex and easily misassembled during connector assembling.

Hence, an electrical connector with an improved cover is desired to solve the above problems.

BRIEF SUMMARY OF THE INVENTION

The present invention provides an electrical connector including an insulative housing, a plurality of contacts retained in the insulative housing and a cover shielding the insulative housing. The insulative housing includes a top wall, a pair of side walls extending downwardly from opposite lateral sides of the top wall, and a plug-receiving cavity formed by the top wall and the side walls. The plug-receiving cavity extends forwardly through a front mating surface of the insulative housing in a first direction. Each contact includes a resilient contacting portion extending into the plug-receiving cavity. The cover includes a top plate covering the top wall and a pair of side plates respectively covering the pair of side walls. Each side plate includes an engaging arm extending inwardly therefrom. The insulative housing defines a pair of cutouts formed at boundaries of the top wall and the pair of side walls. Each cutout is located behind the front mating surface in the first direction. The pair of cutouts are in communication with the plug-receiving cavity. The pair of engaging arms extend into the plug-receiving cavity through the pair of cutouts, respectively. As a result, the cover can be easily and correctly assembled to the insulative housing with high efficiency.

The foregoing has outlined rather broadly the features and technical advantages of the present invention in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described hereinafter which form the subject of the claims of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The components in the drawing are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the described embodiments. In the drawings, reference numerals designate corresponding parts throughout various views, and all the views are schematic.

FIG. **1** is a perspective view of an electrical connector in accordance with an illustrated embodiment of the present invention;

FIG. **2** is an exploded view of the electrical connector as shown in FIG. **1**;

FIG. **3** is a perspective view of an insulative housing of the electrical connector as shown in FIG. **2**;

FIG. **4** is another perspective view of the insulative housing as shown in FIG. **3**;

FIG. **5** is a top view of the insulative housing as shown in FIG. **3**;

FIG. **6** is a perspective view of some contacts of the electrical connector as shown in FIG. **2**;

FIG. **7** is a perspective view of a cover of the electrical connector as shown in FIG. **2**; and

FIG. **8** is a perspective view of a deformable member of the electrical connector as shown in FIG. **2**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference will now be made to the drawing figures to describe the embodiments of the present invention in detail. In the following description, the same drawing reference numerals are used for the same elements in different drawings.

Referring to FIGS. **1** and **2**, the present invention discloses an electrical connector **100** for being mounted to a circuit board (not shown) for receiving a plug connector (not shown). According to the illustrated embodiment of the present invention, the electrical connector **100** is a kind of RJ 45 connector. The electrical connector **100** includes an insulative housing **10**, a plurality of contacts **20** retained in the insulative housing **10**, a cover **30** shielding the insulative housing **10**, a pair of deformable members **40** fixed to the insulative housing **10**, a pair of LED members **50** assembled to the insulative housing **10**, and a pair of L-shaped brackets **60** fixed to the insulative housing **10** to support the LED members **50**.

Referring to FIGS. **2** to **5**, the insulative housing **10** includes a body **70** and a frame **80** forwardly connecting with the body **70** along a first direction (i.e., a front and rear direction). The frame **80** is substantially rectangular shaped and is not totally enclosed because of a bottom opening **801**. The frame **80** includes a front mating surface **802** for mating with the plug connector. The body **70** includes a rear wall **12**, a top wall **13**, a bottom wall **14** and a pair of side walls **15** extending downwardly from opposite lateral sides of the top wall **13**. A plug-receiving cavity **16** is formed by the top wall **13**, the bottom wall **14**, the pair of side walls **15** and the rear wall **12**. Besides, the plug-receiving cavity **16** further extends forwardly through the front mating surface **802** in the first direction. The frame **80** is higher than the top wall **13** so as to form a step **803** therebetween. The LED members **50** are exposed to the front mating surface **802** as shown in FIG. **1**.

The insulative housing **10** includes a pair of cutouts **17** formed at boundaries of the top wall **13** and the pair of side walls **15**. Each cutout **17** is located behind the front mating surface **802** in the first direction. The pair of cutouts **17** are in communication with the plug-receiving cavity **16**. As shown in FIG. **4**, the rear wall **12** includes a plurality of slots **121** extending rearwardly therethrough. A bottom side of the top wall **13** defines a plurality of passageways **131** extending rearwardly through the rear wall **12**. The slots **121** and the passageways **131** are in communication with each other for

cooperatively receiving the contacts **20**. As shown in FIG. **5**, the rear wall **12** further includes a plurality of ribs **122** and a plurality of positioning grooves **123** between each adjacent two ribs **122** for positioning the contacts **20**.

Referring to FIGS. **2** and **3**, the bottom wall **14** defines a pair of slots **141** in communication with the plug-receiving cavity **16**. The slots **141** extend partly through the bottom wall **14**. The deformable members **40** are fixed in the pair of slots **141** and further extend upwardly into the plug-receiving cavity **16** for preventing insertion of an incorrect plug connector. According to the illustrated embodiment of the present invention, the deformable members **40** are made of metal. As shown in FIG. **8**, each deformable member **40** is L-shaped and includes a flat portion **41**, a curved elastic portion **42** extending forwardly from the flat portion **41** and a retaining portion **43** bent perpendicularly from the flat portion **41**. The elastic portion **42** includes a widen portion **421** for engaging with the bottom wall **14** so as to prevent the deformable member **40** from moving along the first direction.

Referring to FIGS. **1** to **5**, each side wall **15** includes a front block **151** and a rear block **155** in alignment with the front block **151** along the first direction. The front block **151** and the rear block **155** protrude sidewardly and outwardly from corresponding side wall **15**. Referring to FIG. **1**, it is understandable that both the front block **151** and the rear block **155** can be used to position the circuit board. The front block **151** stretches the frame **80** and the side wall **15** and is located adjacent to the front mating surface **802**. The front block **151** includes a slit **152** as shown in FIG. **5** for mating with the cover **30**. Besides, each side wall **15** further includes a fixed block **153** at the rear of the cutout **17** along the first direction. The front block **151** and the rear block **155** are located below the fixed block **153**.

Referring to FIGS. **2** and **6**, the contacts **20** include a plurality of first contacts **201** and a plurality of second contacts **202** alternately arranged with each other along a sideward direction (i.e., a left and right direction) perpendicular to the first direction. Each contact **20** includes a fixing portion **22** received in the passageways **131**, a resilient contacting portion **21** extending backwardly and slantly from a front end of the fixing portion **22**, a L-shaped portion **23** bent from a rear end of the fixing portion **22**, and a soldering portion **24** bent downwardly from the L-shaped portion **23** for being mounted to the circuit board. The contacting portions **21** extend into the plug-receiving space **16** for mating with the plug connector to establish signal transmission. The fixing portion **22** includes a plurality of barbs **221** which rigidly engage with inner sides of the passageways **131** by interference fit. The L-shaped portion **23** includes a vertical portion **231** received in the slot **121** and a horizontal portion **232** positioned in the positioning grooves **123**. Each soldering portion **24** extends downwardly beyond the insulative housing **10** for being soldered to the circuit board. The horizontal portions **232** of the first contacts **201** and the second contacts **202** are different in length so that the soldering portions **24** of the contacts **20** are regulated along the first direction in at least two rows.

Referring to FIGS. **2** and **7**, the cover **30** is of one piece and is bottom open. According to the illustrated embodiment of the present invention, the cover **30** is made of metal and includes a top plate **31** covering the top wall **13** and a pair of side plates **32** respectively covering the pair of side walls **15**. Each side plate **32** includes a front edge **320**, an engaging arm **33** extending inwardly and rearwardly from the front edge **320**, a rectangular opening **321** opposite to the engaging arm **33** and an L-shaped mounting leg **35** positioned between the engaging arm **33** and the opening **321** in the first direction. The mounting leg **35** extends sidewardly and downwardly from a bottom edge of the side plate **32** for being mounted to the circuit board. Each engaging arm **33** includes a first resilient portion **331** extending inwardly from the front edge **320** and a second resilient portion **332** further bent slantwise and backwardly from the first resilient portion **331**. Besides, in order to realize simple manufacture and improve the elasticity of the engaging arm **33**, each side plate **32** includes a pair of small notches **322** recessed from the front edge **320** with corresponding first resilient portion **331** positioned between the pair of small notches **322**. Each side plate **32** further includes a fixing piece **34** below the first resilient portion **331**.

Referring to FIG. **3**, in assembling, the cover **30** is downwardly assembled to the insulative housing **10** along a second direction (i.e., a top-to-bottom direction) perpendicular to the first direction. The pair of cutouts **17** are large enough so that the pair of engaging arms **33** can be assembled in position without any deformation thereof, when the cover **30** is assembled to the insulative housing **10**. The first resilient portions **331** are positioned mainly occupying thickness of the side walls **15** for space saving. Each first resilient portion **331** is perpendicular to corresponding side plate **32**. The second resilient portions **332** extend into the plug-receiving cavity **16** for abutting against the plug connector. Besides, the fixed blocks **153** are locked in the openings **321** so as to prevent the cover **30** from escaping the insulative housing **10** along a bottom-to-top direction. The fixing pieces **34** are fastened in the slits **152**. A front end of the top plate **31** is restricted by the step **803** along the first direction. As a result, the cover **30** can be easily and correctly assembled to the insulative housing **10** with high efficiency.

It is to be understood, however, that even though numerous characteristics and advantages of preferred and exemplary embodiments have been set out in the foregoing description, together with details of the structures and functions of the embodiments, the disclosure is illustrative only; and that changes may be made in detail within the principles of present disclosure to the full extent indicated by the broadest general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. An electrical connector comprising:

an insulative housing comprising a top wall, a pair of side walls extending downwardly from opposite lateral sides of the top wall and a plug-receiving cavity formed by the top wall and the side walls, the plug-receiving cavity extending forwardly through a front mating surface of the insulative housing in a first direction;

a plurality of contacts each comprising a resilient contacting portion extending into the plug-receiving cavity;

a cover shielding the insulative housing and comprising a top plate covering the top wall and a pair of side plates respectively covering the pair of side walls, each side plate comprising an engaging arm extending inwardly therefrom; wherein

the insulative housing defines a pair of cutouts formed at boundaries of the top wall and the pair of side walls, each cutout being located behind the front mating surface in the first direction, the pair of cutouts being in communication with the plug-receiving cavity, the pair of engaging arms extending into the plug-receiving cavity through the pair of cutouts, respectively;

wherein each side plate comprises a front edge, each engaging arm comprising a first resilient portion extending from the front edge and a second resilient portion further bent slantwise and backwardly from the first

resilient portion, the second resilient portion extending into the plug-receiving cavity;

wherein each side plate defines a pair of small notches recessed from the front edge with corresponding first resilient portion positioned between the pair of small notches.

2. The electrical connector as claimed in claim **1**, wherein the cover is downwardly assembled to the insulative housing along a second direction perpendicular to the first direction.

3. The electrical connector as claimed in claim **2**, wherein the pair of cutouts are large enough so that the pair of engaging arms can be assembled in position without any deformation thereof when the cover is assembled to the insulative housing.

4. The electrical connector as claimed in claim **1**, wherein the first resilient portion is positioned mainly occupying a thickness of the side wall, the first resilient portion being perpendicular to the side plate.

5. The electrical connector as claimed in claim **1**, wherein each side plate comprises a fixing piece below the first resilient portion, each side wall comprises a block protruding sidewardly and outwardly therefrom, and the block defines a slit to fasten the fixing piece along a top-to-bottom direction.

6. The electrical connector as claimed in claim **1**, wherein each side plate defines an opening opposite to the engaging arm, and each side wall comprises a fixed block locked in the opening so as to prevent the cover from escaping the insulative housing.

7. The electrical connector as claimed in claim **6**, wherein each side plate comprises a L-shaped mounting leg extending sidewardly and downwardly from a bottom edge of the side plate for being mounted to a circuit board, the mounting leg being positioned between the engaging arm and the opening in the first direction.

8. The electrical connector as claimed in claim **1**, wherein the insulative housing comprises a bottom wall opposite to the top wall and a rear wall opposite to the front mating surface, the plug-receiving cavity being corporately formed by the top wall, the bottom wall, the side walls and the rear wall; and wherein

the bottom wall defines a pair of slots in communication with the plug-receiving cavity, and the electrical connector comprises a pair of deformable members fixed in the pair of slots and further extending upwardly into the plug-receiving cavity for preventing insertion of an incorrect plug connector.

9. An electrical connector comprising:

an insulative housing comprising a body and a frame forwardly connecting with the body, the frame defining a front mating surface, the body comprising a top wall, a bottom wall, a pair of side walls and a rear wall with a plug-receiving cavity formed thereby, the plug-receiving cavity extending forwardly through the front mating surface in a first direction, the frame being higher than the top wall so as to form a step therebetween;

a plurality of contacts each comprising a resilient contacting portion slantwise extending into the plug-receiving cavity;

a cover shielding the insulative housing and comprising a top plate covering the top wall and a pair of side plates respectively covering the pair of side walls, a front end of the top plate being restricted by the step along the first direction, each side plate comprising an engaging arm extending inwardly therefrom; wherein

the insulative housing defines a pair of cutouts located behind the front mating surface along the first direction, the pair of cutouts are in communication with the plug-receiving cavity, and the pair of engaging arms extending into the plug-receiving cavity through the pair of cutouts, respectively;

wherein each side plate comprises a front edge, each engaging arm comprising a first resilient portion extending from the front edge and a second resilient portion further bent slantwise and backwardly from the first resilient portion, the second resilient portion extending into the plug-receiving cavity;

wherein each side plate defines a pair of small notches recessed from the front edge, and corresponding first resilient portion is positioned between the pair of small notches.

10. The electrical connector as claimed in claim **9**, wherein the cover is downwardly assembled to the insulative housing along a second direction perpendicular to the first direction.

11. The electrical connector as claimed in claim **10**, wherein the pair of cutouts are formed at boundaries of the top wall and the pair of side walls, and the pair of cutouts are large enough so that the pair of engaging arms can be assembled in position without any deformation thereof when the cover is assembled to the insulative housing.

12. The electrical connector as claimed in claim **9**, wherein each side plate comprises a fixing piece below the first resilient portion, each side wall comprises a block protruding sidewardly and outwardly therefrom, and the block defines a slit to fasten the fixing piece along a top-to-bottom direction.

13. The electrical connector as claimed in claim **9**, wherein each side plate defines an opening opposite to the engaging arm and a L-shaped mounting leg positioned between the engaging arm and the opening in the first direction, each side wall comprising a fixed block locked in the opening so as to prevent the cover from escaping the insulative housing.

14. The electrical connector as claimed in claim **9**, wherein the bottom wall defines a pair of slots in communication with the plug-receiving cavity, and the electrical connector comprises a pair of deformable members fixed in the pair of slots and further extending upwardly into the plug-receiving cavity for preventing insertion of an incorrect plug connector.

15. The electrical connector as claimed in claim **14**, wherein each deformable member comprises a widen portion for engaging with the bottom wall so as to prevent the deformable member from moving along the first direction.

16. The electrical connector as claimed in claim **9**, further comprising a pair of LED members assembled to the insulative housing and a pair of L-shaped brackets fixed to the insulative housing to support the LED members, the LED members being exposed to the front mating surface.

17. An electrical connector comprising:

an insulative housing comprising a top wall, a pair of side walls extending downwardly from opposite lateral sides of the top wall and a plug-receiving cavity formed by the top wall and the side walls, the plug-receiving cavity extending forwardly through a front mating surface of the insulative housing in a first direction;

a plurality of contacts each comprising a resilient contacting portion extending into the plug-receiving cavity;

a cover shielding the insulative housing and comprising a top plate covering the top wall and a pair of side plates respectively covering the pair of side walls, each side plate comprising an engaging arm extending inwardly therefrom; wherein

the insulative housing defines a pair of cutouts formed at boundaries of the top wall and the pair of side walls, each cutout being located behind the front mating surface in the first direction, the pair of cutouts being in communication with the plug-receiving cavity, the pair of

engaging arms extending into the plug-receiving cavity through the pair of cutouts, respectively;

wherein the insulative housing comprises a bottom wall opposite to the top wall and a rear wall opposite to the front mating surface, the plug-receiving cavity being corporately formed by the top wall, the bottom wall, the side walls and the rear wall; and

wherein the bottom wall defines a pair of slots in communication with the plug-receiving cavity, and the electrical connector comprises a pair of deformable members fixed in the pair of slots and further extending upwardly into the plug-receiving cavity for preventing insertion of an incorrect plug connector.

18. An electrical connector comprising:

an insulative housing comprising a body and a frame forwardly connecting with the body, the frame defining a front mating surface, the body comprising a top wall, a bottom wall, a pair of side walls and a rear wall with a plug-receiving cavity formed thereby, the plug-receiving cavity extending forwardly through the front mating surface in a first direction, the frame being higher than the top wall so as to form a step therebetween;

a plurality of contacts each comprising a resilient contacting portion slantwise extending into the plug-receiving cavity;

a cover shielding the insulative housing and comprising a top plate covering the top wall and a pair of side plates respectively covering the pair of side walls, a front end of the top plate being restricted by the step along the first direction, each side plate comprising an engaging arm extending inwardly therefrom; and

a pair of LED members assembled to the insulative housing and a pair of L-shaped brackets fixed to the insulative housing to support the LED members, the LED members being exposed to the front mating surface;

wherein the insulative housing defines a pair of cutouts located behind the front mating surface along the first direction, the pair of cutouts are in communication with the plug-receiving cavity, and the pair of engaging arms extending into the plug-receiving cavity through the pair of cutouts, respectively.

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